

WHAT IS CLAIMED IS:

1. An apparatus for circumferentially measuring a tubular member, the apparatus comprising:
 - 5 first and second template members cooperably defining an aperture defining a cross-sectional reference shape of the tubular member, the first and second template members being configured to receive the tubular member in the aperture, at least one of the first and second members being adjustable such that the aperture is configured to be adjusted between open and closed positions; and
 - 10 a measurement device configured to detect the relative position of the first and second template members, thereby measuring the relative adjustment of at least one of the members between the open and closed positions, a measurement of the measurement device being indicative of the cross-sectional size of the tubular member.
- 15 2. An apparatus according to Claim 1 further comprising a hinge connection between the first and second template members, at least one of the template members thereby being rotatably adjustable relative to the other of the template members.
- 20 3. An apparatus according to Claim 2 wherein the measurement device is configured to measure a gap between the first and second template members opposite the aperture from the hinge connection.
4. An apparatus according to Claim 1 wherein the aperture is generally circular.
- 25 5. An apparatus according to Claim 1 wherein the measurement device is an electronic device configured to automatically measure the relative position of the template members.
- 30 6. An apparatus according to Claim 1 wherein the measurement device is configured to measure a gap between the first and second template members.

7. An apparatus according to Claim 1 wherein the measurement device is configured to determine a diameter of the tubular member.

8. An apparatus according to Claim 1 wherein each of the first and second template members includes at least two plates, each of the plates of the first template member defining a first portion of the aperture and being configured in a spaced relationship, each of the plates of the second template member defining a second portion of the aperture and being configured in a spaced relationship.

10 9. An apparatus according to Claim 1 further comprising an urging device configured to apply a predetermined force to the members to urge the members toward the closed position.

10. An apparatus for circumferentially measuring a tubular member, the apparatus comprising:

first and second rigid template members cooperably defining an aperture defining a generally circular cross-sectional reference shape, the first and second template members being configured to receive the tubular member in the aperture, the first and second members being hingedly connected such that the aperture is configured to be adjusted between open and closed positions; and

20 a measurement device configured to detect a gap between the first and second template members, thereby measuring the relative adjustment of the template members between the open and closed positions, a measurement of the measurement device being indicative of the cross-sectional size of the tubular member.

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11. An apparatus according to Claim 10 wherein the measurement device is positioned opposite the aperture from a position of a hinge connecting the first and second template members.

30 12. An apparatus according to Claim 10 wherein the measurement device is an electronic device configured to automatically measure the relative position of the template members.

13. An apparatus according to Claim 10 wherein the measurement device is configured to measure a gap between the first and second template members.

14. An apparatus according to Claim 10 wherein the measurement device is
5 configured to determine a diameter of the tubular member.

15. An apparatus according to Claim 10 wherein each of the first and second template members includes at least two plates, each of the plates of the first template member defining a first portion of the aperture and being configured in a spaced relationship, each of the plates of the second template member defining a second portion of the aperture and being configured in a spaced relationship.
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16. An apparatus according to Claim 10 further comprising an urging device configured to apply a predetermined force to the members to urge the members
15 toward the closed position.

17. A method for circumferentially measuring a tubular member, the method comprising:
inserting the tubular member into an aperture defined by first and second
20 cooperable template members;
adjusting at least one of the template members to at least partially close the aperture, thereby urging the tubular member to a cross-sectional shape corresponding to a reference shape of the aperture;
measuring the relative position of the first and second template members; and
25 determining a cross-sectional size of the tubular member according to the relative position of the first and second template members.

18. A method according to Claim 17 further comprising providing the template members, the first template member including at least two plates defining a first portion of the aperture, each of the plates of the first template member being configured in a spaced relationship, the second template member including at least two plates defining a second portion of the aperture, each of the plates of the second template member being configured in a spaced relationship.
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19. A method according to Claim 17 wherein said adjusting step comprises rotating at least one of the template members about a hinge connection between the first and second template members.

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20. A method according to Claim 19 wherein said measuring step comprises measuring a gap between the first and second template members at a position opposite the aperture from the hinge connection.

10 21. A method according to Claim 17 wherein said adjusting step comprises applying a predetermined force to the members to urge the members toward a closed position.

15 22. A method according to Claim 17 wherein said adjusting step comprises urging the tubular member to a generally circular cross-sectional shape.

23. A method according to Claim 17 wherein said measuring step comprises measuring a gap between the first and second template members.

20 24. A method according to Claim 17 further comprising configuring an electronic measurement device to measure the relative position of the template members and wherein said measuring step comprises electronically measuring the relative position of the template members.

25 25. A method according to Claim 17 wherein said determining step comprises determining a diameter of the tubular member.

26. An apparatus for measuring a tubular member, the apparatus comprising:
first and second template members cooperably defining an aperture generally
defining a cross-sectional reference shape of the tubular member, the first and second
template members being configured to receive the tubular member in the aperture, at

5 least one of the first and second members being adjustable such that the aperture is
configured to be adjusted between open and closed positions; and

a plurality of measurement devices positioned at circumferentially spaced
locations around the perimeter of the aperture, the measurement devices configured to
contact the tubular member when the aperture is adjusted to the closed position, each
10 of the measurement devices being configured to provide an output characteristic of a
contact force between the measurement device and the tubular member such that the
outputs of the measurement devices are indicative of a measurement of the tubular
member.

15 27. An apparatus according to Claim 26 further comprising a hinge connection
between the first and second template members, at least one of the template members
thereby being rotatably adjustable relative to the other of the template members.

28. An apparatus according to Claim 26 wherein the aperture is generally circular.

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29. An apparatus according to Claim 26 wherein each measurement device is
configured to detect at least one of a force, pressure, and stress in the measurement
device that is representative of the stiffness of the tubular member.

25 30. An apparatus according to Claim 26 wherein the apparatus is configured to
determine a variation of the thickness of the tubular member according to the outputs
of the measurement devices.

31. An apparatus according to Claim 26 further comprising an urging device
30 configured to apply a predetermined force to the members to urge the members
toward the closed position.

32. A method for measuring a tubular member, the method comprising:
inserting the tubular member into an aperture defined by first and second
cooperable template members;

5 adjusting at least one of the template members to at least partially close the
aperture, thereby positioning a plurality of measurement devices disposed on the
template members in contact with the tubular member;

providing a plurality of outputs characteristic of contact forces between the
measurement devices and the tubular member at a plurality of circumferential
locations of the tubular member; and

10 determining a measurement of the tubular member according to the outputs.

33. A method according to Claim 32 wherein said adjusting step comprises
rotating at least one of the template members about a hinge connection between the
first and second template members.

15 34. A method according to Claim 32 wherein said adjusting step comprises
applying a predetermined force to the members to urge the members toward a closed
position.

20 35. A method according to Claim 32 wherein said measuring step comprises
detecting at least one of a force, pressure, and stress that is representative of the
stiffness of the tubular member.

25 36. A method according to Claim 32 wherein said determining step comprises
determining a variation of the thickness of the tubular member according to the
outputs.

30 37. A method according to Claim 32 wherein said adjusting step comprises
applying a predetermined force to the members to urge the members toward the
closed position.